

WHAT IS CLAIMED IS:

1. A process for recycling a vapor-phase chemical comprising:
5 introducing vapor-phase chemicals into a reactor with sufficiently supplied energy
to cause a reaction in said reactor;

10 *017* exhausting gases from said reactor resulting from said reaction;
separating a first gas from said exhausted gases;
purifying said first gas; and thereafter
introducing said first gas into said reactor.

2. The process of Claim 1, wherein said reaction comprises depositing a thin
film layer on a substrate positioned in said reactor.

15 *007* 3. The process of Claim 1, wherein said first gas comprises H₂.

4. The process of Claim 1, wherein said vapor-phase chemicals comprise H₂.
5. The process of Claim 4, wherein said first gas comprises between 80% to
20 90% of the quantity of said H₂ introduced in said reactor.

25 6. The process of Claim 1, wherein the sufficient supplied energy comprises
an RF low frequency power energy level of between about 0.318 watts/cm² to about
3.18 watts/cm².

7. The process of Claim 1, wherein said reactor comprises a tapered outer
shell surrounding a tapered susceptor.

8. A process for recycling a gas used in semiconductor processing
30 applications, said process comprising:
introducing H₂ into a semiconductor reactor;

exhausting at least a portion of said H₂ from said reactor;
purifying said exhausted H₂; and thereafter
introducing said purified H₂ into said semiconductor reactor.

5 9. The process of Claim 8, further comprising introducing vapor-phase chemicals into a reactor with sufficiently supplied energy to cause a reaction in said reactor.

10 10. The process of Claim 8, wherein said purified H₂ comprises between 80% to 90% of the quantity of said H₂ introduced in said reactor.

11. 11. A system for recycling a vapor phase chemical, said system comprising:
a reactor chamber capable of receiving and exhausting vapor-phase chemicals;
a gas scrubber capable of receiving vapor-phase chemicals exhausted from said
15 reactor chamber and outputting a first gas; and
a gas purifier capable of purifying said first gas, said purified first gas being
returnable to said reactor chamber.

12. 12. The system of Claim 11, wherein said reactor chamber is a
20 PECVD reactor.

13. 13. The system of Claim 11, wherein said first gas comprises H₂.

14. 14. The system of Claim 11, wherein said purified first gas comprises H₂
25 comprising between 80% to 90% of the quantity of said H₂ introduced in said reactor.

15. 15. The system of Claim 11, further comprising a pump for pumping said first
gas through said system.